

Gyrokinetic simulations of double tearing modes in toroidal plasma

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An investigation of the characteristics of double-tearing modes (DTMs) and the influence of the kinetic effects of ions has been carried out with the gyrokinetic code GTC. It was found that as the separation of the rational surfaces was increased, the growth rates of DTMs were enhanced and the DTM system tended to decouple into a system of two single-tearing modes. When the width between the rational surfaces is larger, the corresponding amplitude of the inner-tearing mode is smaller. We also demonstrate that the existence of thermal ions destabilizes the DTM. The toroidal effect also has a mild destabilizing effect 8% on the growth of DTMs, which is consistent with the theoretical analysis.

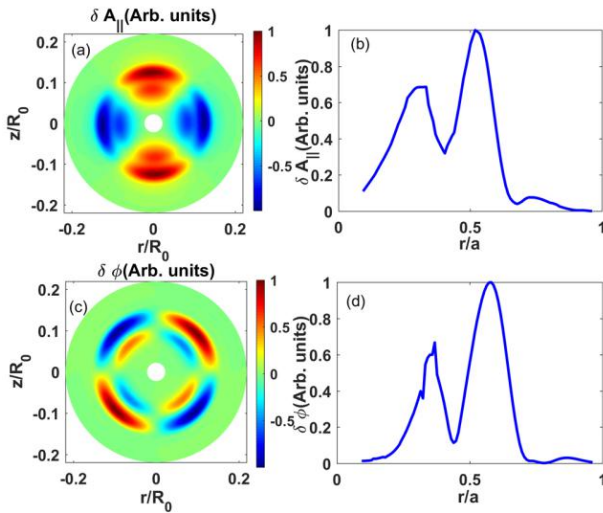


Fig. 1 $(m/n) = (2, 1)$ DTMs mode structure. (a) and (c) are the contours of perturbed electrostatic potential and perturbed parallel vector potential on the 2D poloidal cross-section. (b) and (d) are the radial profile of perturbed parallel vector potential and perturbed electrostatic potential at $\theta=90^\circ$ and $\theta=45^\circ$, respectively.

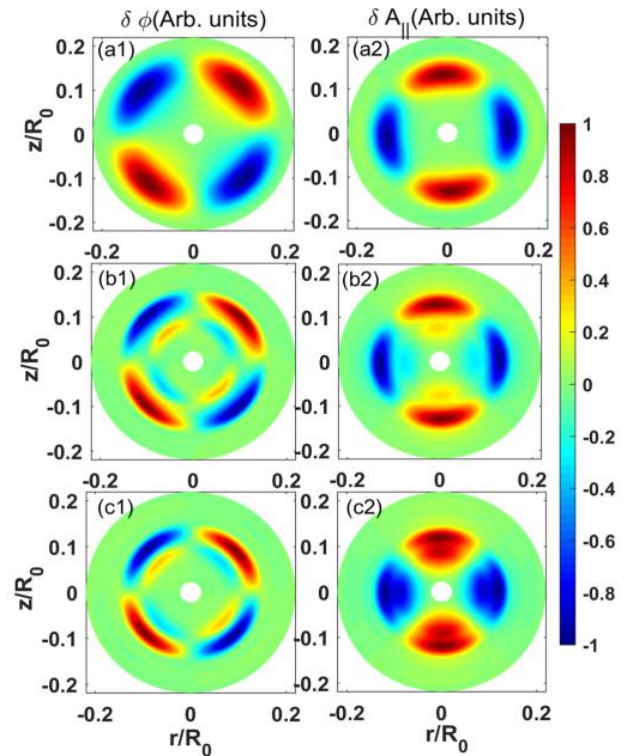


Fig. 2 Poloidal contour plots of perturbed electrostatic potential and perturbed parallel vector potential with different separations of rational surfaces.

References

- [1] J. C. Li, et al., 2017 Phys. Plasmas 24 082508
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Note: Abstract should be in (full) double-columned one page